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ABSTRACT

A study was undertaken to provide a database relative to the missions and objectives for undergraduate programs in agriculture. Over 900 faculty representing 50 randomly selected universities offering undergraduate degrees responded to a mailed questionnaire. Graduating seniors at land grant universities were surveyed. Faculty findings included the following: (1) critical thinking and technical competence were the most frequently supported primary objectives essential to undergraduate education in agriculture; (2) two enabling objectives--written communication and oral communication--received the greatest amount of support; (3) approximately two-thirds indicated that their colleges and respective departments had written mission and objective statements, but only one-half of the two-thirds reported having a working knowledge of the mission and objectives; and (4) 97 percent agreed that faculty have primary responsibility for monitoring student attainment of undergraduate educational objectives, but there was little evidence to suggest that this is currently occurring on a formal basis. Both faculty and students had very similar perceptions regarding the seniors' technical competence and competence relative to comprehensive application; however, only 72 percent of the graduating seniors thought that they possessed entry-level competence relative to career and job orientation whereas 86 percent of the faculty felt that the students did. Data is displayed in four tables and seven figures. (CML)

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UNDERGRADUATE EDUCATION IN AGRICULTURE

A National Study of Agriculture Colleges in the United States

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The Office of Science and Education Administration
United States Department of Agriculture

During the early to mid-1980s, personnel representatives of both the higher education community and the private agricultural business sector raised rather poignant questions related to both the content and quality of undergraduate agriculture programs. The quality dimension had two important aspects---quality of the program and quality of the product. Questions posed were not unique to undergraduate programs in agriculture. Similar questions were raised relative to all undergraduate programs in higher education as evidenced in Boyer's *College: The Undergraduate Experience in America.*

Undergraduate agriculture programs traditionally have operated within an internal and external contextual environment, a relationship that, no doubt, influenced the importance of the questions raised. Externally, agriculture in the 1970-80s was experiencing rapid technological and economic changes. Internally, dramatic changes had occurred relative to the composition of the undergraduate student population in agriculture. College enrollments were declining, and a greater proportion of agriculture undergraduates were of urban and suburban backgrounds. Many undergraduates did not have previous agricultural experiences. No longer could faculty deliver instruction assuming students had a uniform core of agricultural experiences and understanding.

That context provided the basis for representatives of higher education and private industry to question the quality of the undergraduate experience in agriculture. Questions were raised about the practical agriculture experience base of current graduates and their ability to solve problems, think critically, communicate effectively, and provide the leadership needed in a constantly changing agricultural economy.

Purpose

The general goal of the project was to provide a data base relative to the missions and objectives for undergraduate programs in agriculture. Related questions to be answered included: (1) What are the primary and enabling objectives for a well-rounded education in agriculture? (2) To what extent do agricultural colleges and departments have formalized mission and objective statements? (3) To what extent do faculty have the ability to deliver instruction which addresses the objectives for an undergraduate education? (4) To what extent do current seniors possess entry-level competence relative to the objectives for an undergraduate education?

Procedures

Over 900 faculty representing 50 randomly selected universities offering undergraduate degree programs in agriculture responded to a mailed questionnaire. These faculty represented both the National Association of State Universities and Land Grant Colleges and American Association of State Colleges of Agriculture and Renewable Resources institutions. Also, at both 1862 and 1890 land grant universities, graduating seniors were surveyed regarding their entry-level competence relative to the undergraduate objectives.

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WHAT SHOULD BE THE MISSION AND OBJECTIVES?

Primary Objectives

Faculty were asked to consider four primary objectives and indicate to what extent they supported these objectives as being essential for an undergraduate education in agriculture. The objectives were:

- Career and job orientation. Knowledge of careers in major and general job requirements.
- Technical competence. Knowledge of specifics, including facts, data, basic scientific tools, and fundamentals used in problem solving.
- Comprehensive application. Application of basic information, including translating, interpreting and extrapolating.
- Critical thinking. Analysis of basic information, including synthesis of information and evaluation of outcomes.

Faculty generally supported the primary objectives (Figure 1). Critical thinking (98%) and technical competence (97%) were most frequently supported as essential to an undergraduate education in agriculture.

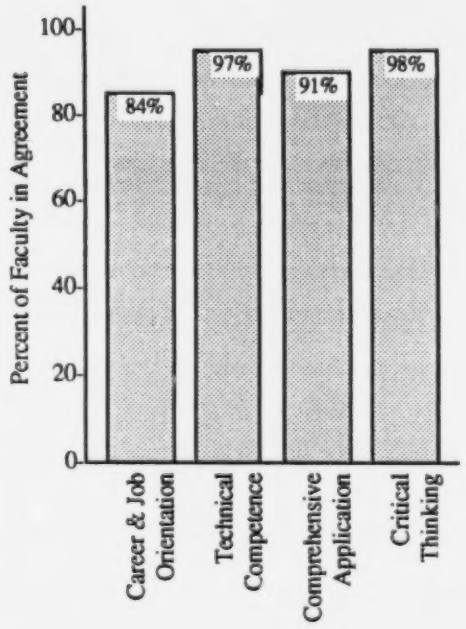

Figure 1

Faculty Support for the Primary Objectives of Undergraduate Programs in Agriculture

Career and job orientation received the least support (84%) as being essential in an undergraduate agriculture education.

Enabling Objectives

Six enabling objectives were examined by faculty to determine to what extent faculty considered the enabling objectives as essential for an undergraduate education. The enabling objectives included:

- Written communication. The ability to write effectively.
- Oral communication. The ability to speak effectively.
- Values development. Formulation of value system relative to issues and concerns.
- Interpersonal development. Awareness of others' needs and ability to get along with others.
- Leadership development. Ability to organize groups and assist groups in achieving agreed upon goals.
- Computer competence. Use mainframe or microcomputer to use data bases, spread sheets, and word processing.

All enabling objectives, except for selected aspects of computer competence, were generally supported by faculty (Figure 2).

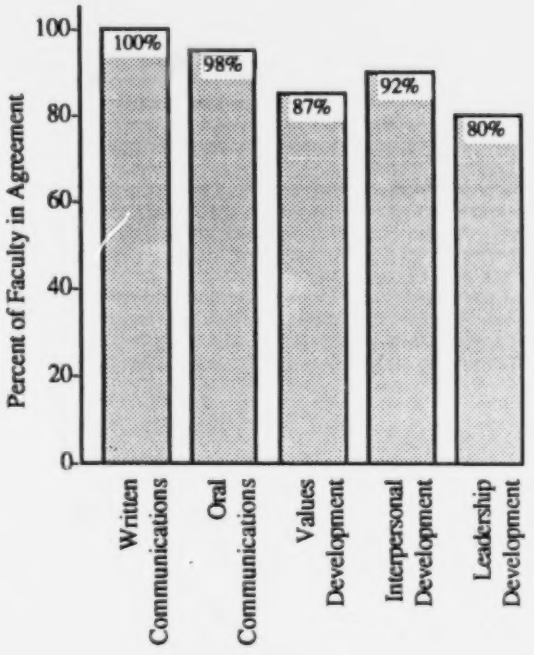

Figure 2

Faculty Support for the Enabling Objectives of Undergraduate Programs in Agriculture

The two enabling objectives of oral (98%) and written (100%) communications received the greatest amount of support from the faculty as being essential for an undergraduate education. Leadership (80%) and values (87%) development received somewhat lower support.

Being able to use a computer or microcomputer was identified as essential by 88 percent of the faculty (Figure 3). There was less support for other specific skills related to computer or microcomputer competence. Less than one-third of the faculty viewed the development of programming competence as an essential objective.

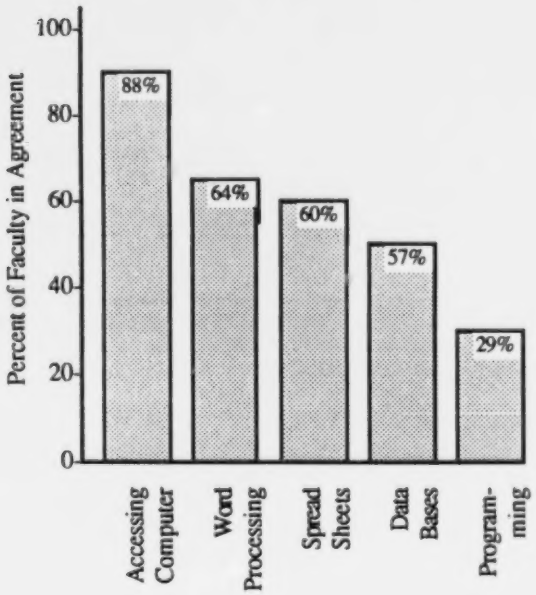

Figure 3

Faculty Support for Enabling Objectives Related to Computer and Microcomputer Competence

The Current Status of Missions and Objectives

Faculty identified whether or not their colleges and departments had objective and mission statements and how familiar they were with those statements. Approximately two-thirds of the faculty indicated that their colleges and respective departments had formulated written mission and objective statements (Table 1).

Though formalized mission statements and objectives existed in about two of every three situations, the ultimate question must address the extent to which faculty are aware and have a working knowledge of those mission statements and objectives. The faculty has the key role in providing instruction which supports the undergraduate mission and objectives.

Table 1

Extent to Which Faculty Reported their College and Departments had Formalized Missions and Objectives.

Information Relative to Current Mission and Objective	Faculty Response (%) Yes	No	Don't Know
Have college-level mission statement	69	7	24
Have college-level objectives	61	9	30
Have department-level mission statement	70	18	12
Have department-level objectives	66	20	14

Of those faculty who reported that a mission statement and objectives existed for their college, only about one-half reported having a working knowledge of the mission and objectives. As one would expect, the results were slightly more positive at the department level. For faculty who reported their department as having a mission statement and objectives, about two-thirds of the faculty reported having a working knowledge of their department's mission and objectives (Table 2).

Table 2

Extent to Which Faculty Reported Having a Working Knowledge of College and Department Missions and Objectives.

Faculty Knowledge of Mission and Objectives	Faculty Possess Knowledge (%) Yes	No
Knowledge of college mission	46	54
Knowledge of college objectives	40	60
Knowledge of department mission	69	31
Knowledge of department objectives	64	36

WHAT IS THE COMPETENCE OF GRADUATES AND THE ROLE OF THE FACULTY?

Extent Graduates Possess Entry-Level Competence

Faculty and graduating seniors reported fairly similar perceptions regarding seniors' entry-level competence for the four primary objectives (Figure 4). Both groups had very similar perceptions regarding the seniors' technical competence and competence relative to comprehensive application. There were some differences of opinion relative to the competence of seniors regarding career and job orientation and critical thinking. Only 72 percent of the graduating seniors thought they possessed entry-level competence relative to career and job orientation. This contrasted with 86 percent of the faculty who felt that seniors possessed career and job orientation entry-level competence.

There was greater disparity between faculty members' and graduating seniors' perceptions regarding entry-level competence for the enabling objectives (Figure 5). Both faculty (76%) and graduating seniors (91%) indicated most frequently that students possessed entry-level competence relative to interpersonal skills. The greatest disparity between faculty and graduating seniors existed with regard to leadership skills. Only 55 percent of the faculty perceived graduating seniors as having entry-level competence relative to leadership, but 87 percent of the graduating seniors perceived they possessed entry-level competence. Slightly more than half (52%) of the faculty thought that graduating seniors had developed entry-level competence regarding values development, or their ability to attend to concerns and issues associated with the students' areas of study.

As anticipated, graduating seniors possessed relatively low competence regarding the use of computers and microcomputers (Figure 6). In reality we suspect that competence in the the use of computers and computer-related technology has increased during the past several years as institutions of higher education have made more concerted efforts to incorporate such technology into the undergraduate instructional experience.

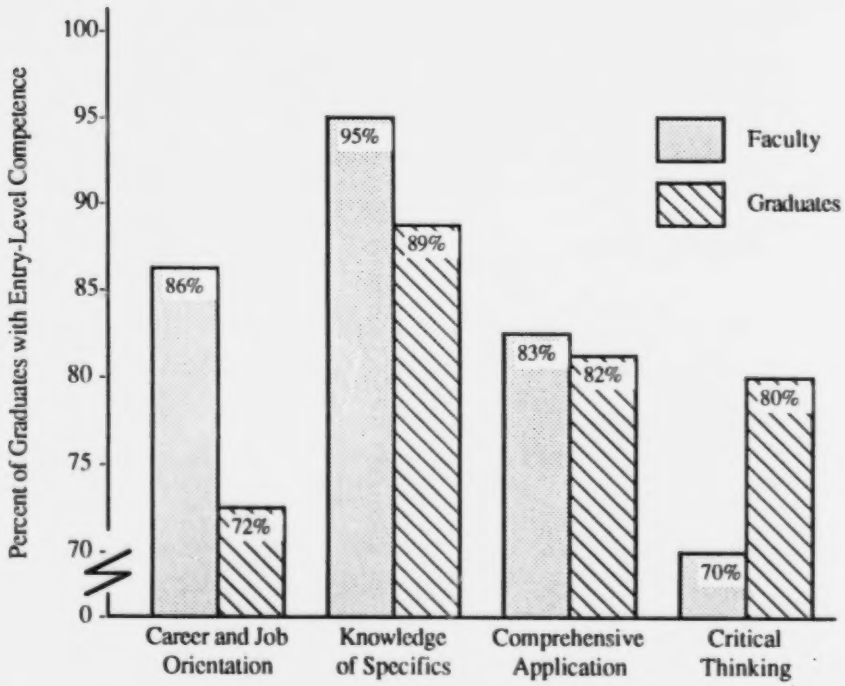

Figure 4

Faculty and Graduates ' Assessment of Graduates' Possession of Entry-Level Competence Relative to Primary Objectives of Undergraduate Education in Agriculture

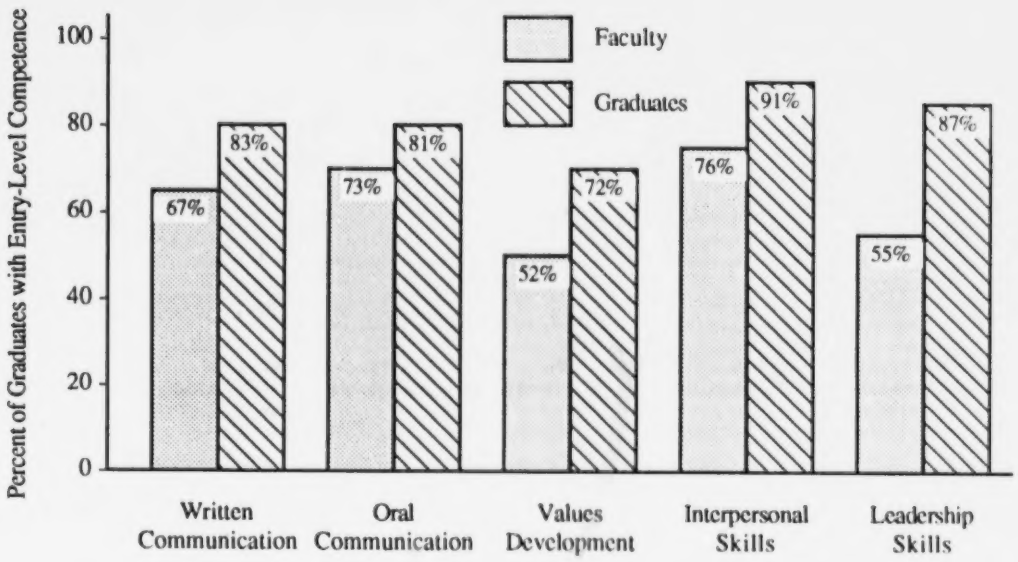

Figure 5

Faculty and Graduates' Assessment of Graduates' Possession of Entry-Level Competence Relative to Enabling Objectives of Undergraduate Education in Agriculture

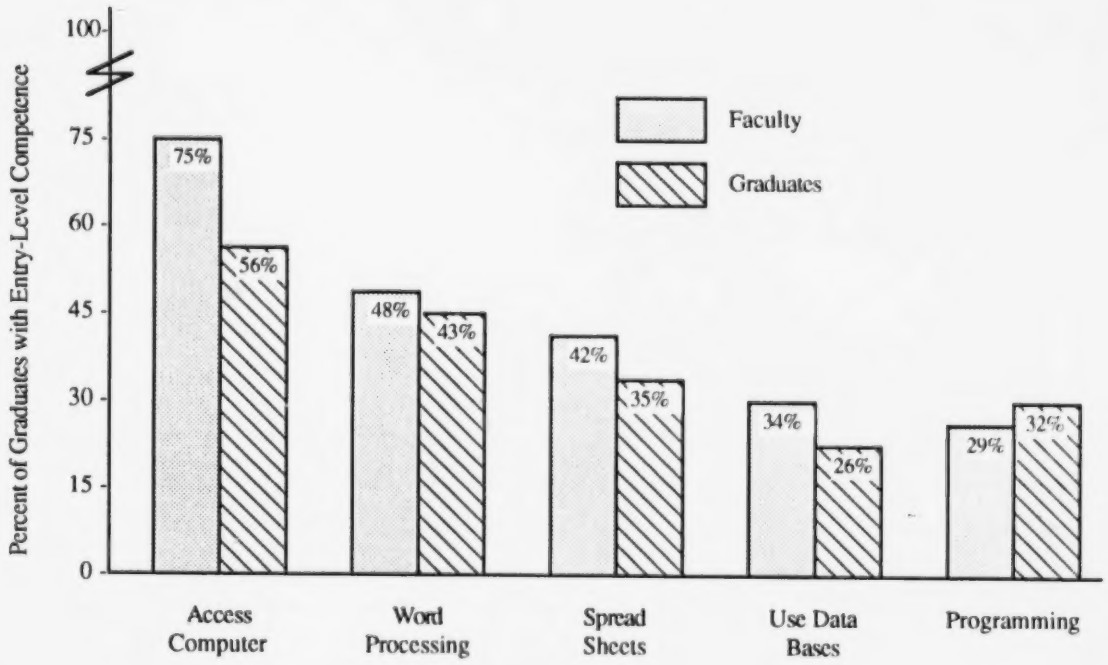

Figure 6

Faculty and Graduates' Assessment of Graduates' Possession of Entry-Level Competence Relative to the Computer and Microcomputer Enabling Objectives for Undergraduate Education in Agriculture

Ability of Faculty to Deliver Instruction Relative to the Undergraduate Objectives

Agriculture faculty members indicated how well they perceived their respective department or unit, as a collective group, could provide instruction relative to the undergraduate educational objectives (Table 3). Faculty generally (90+%) viewed their respective department or unit faculty as able to provide instruction so students attain competence relative to the following primary undergraduate objectives:

- career and job orientation
- technical competence
- comprehension and application in agriculture
- critical thinking and problem solving

In a sense these objectives reflect what most agriculture faculty have traditionally viewed to be their instructional responsibility. However, faculty indicated that undergraduate educational objectives in agriculture are more inclusive than the aforementioned primary objectives.

Table 3

Faculty Beliefs that Department or Unit Faculty Are Able to Teach Relative to the Objectives.

Undergraduate Objective	Number	Percent
Primary Objectives		
Career and job orientation	896	92
Technical competence	893	97
Comprehension & application	884	93
Critical thinking	879	95
Enabling Objectives		
Written communications	874	84
Verbal communications	872	80
Values development	869	82
Interpersonal skills	835	71
Leadership skills	838	76
Computer/micro competence		
Accessing computer	876	83
Word processing	876	78
Spread sheet use	870	75
Data base use	868	74
Programming	867	62

What then is the ability of faculty to deliver instruction related to the enabling instructional objectives? Approximately 80 percent of the faculty perceived their respective department or unit faculty as being able to teach in a manner that students attain entry-level competence relative to the following enabling objectives:

- written communications
- verbal communications
- development of values
- development of interpersonal skills
- development of leadership skills
- development of computer and microcomputer competence

It should be noted that a sizeable proportion of faculty (≈20%) did not believe the faculty is able to teach so students attain competence in these enabling objectives. One would have anticipated faculty to have relatively lower perceptions regarding the collective ability of their department or unit faculty to teach relative to the computer and microcomputer objectives.

Responsibility for and Monitoring of Students' Attainment of Undergraduate Objectives

Faculty agreed (97%) that they have primary responsibility for monitoring student attainment of the undergraduate educational objectives. However, there is little evidence to suggest this assessment or monitoring is currently occurring on a formal basis at either the department or college level. About two-thirds of the faculty members (68%) supported helping students inventory and assess skills as a way to monitor and assess student progress in developing competence relative to the educational objectives. Faculty reported greater support for other more traditional ways of monitoring student progress--providing help in selecting courses, designing learning activities within courses in the major, and providing extra- and intra-curricular opportunities for students.

Faculty frequently have a great degree of autonomy in designing learning opportunities within departmental courses. Relative to the undergraduate objectives, faculty were most supportive (by more than 90%) of developing opportunities in departmental courses to reinforce students' attainment of competence relative to critical thinking, communication skills, and computer skills (Figure 7). Faculty were somewhat less supportive (≈80%) of designing learning opportunities within departmental courses to enhance students' development of values, interpersonal skills, and leadership skills.

Institutional Channels for Curricular Change

Current curricular channels and their effectiveness were assessed. A major channel for curricular change is curriculum committees at college and department levels. Ninety-four percent of the faculty indicated college curriculum committees exist, and 90 percent indicated department curriculum committees exist. Faculty development activities also were identified by faculty (88%) as an institutional mechanism for curricular

change. These faculty development activities were sponsored at all levels of the university (university-level, 18%; college-level, 20%; department-level, 2%; combination of all levels, 50%).

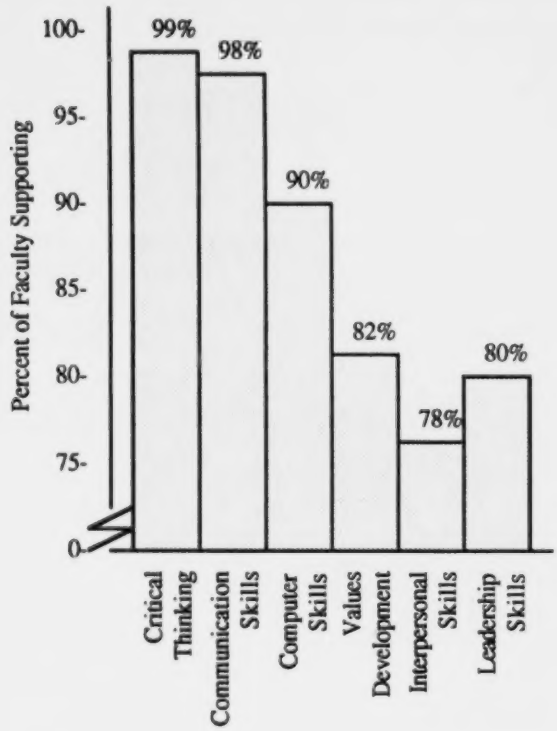

Figure 7

Reinforcement of Undergraduate Education in Agriculture Objectives in Departmental Courses

What is the effectiveness of institutional channels in addressing curricular changes? At the college level faculty were polarized regarding the effectiveness of channels for curricular change (Table 4). Forty-seven percent perceived the channels to be excellent or good, and 43 percent of the faculty perceived the channels at the college level to be fair or poor. At the departmental level the results were more positive. Seventy-two percent of the faculty perceived departmental curricular channels to be excellent or good and 24 percent perceived such channels to be fair or poor.

The perceived value of sponsored faculty development activities in meeting faculty needs was mixed. About half of the faculty (55%) viewed such activities as meeting their needs.

Table 4

Faculty Perceptions Regarding the Effectiveness of Institutional Curricular Channels.

Effectiveness of Institutional Curricular Channels	College Level n	College Level %	Department Level n	Department Level %
Curricular Communication Channels				
Excellent	60	6.6	211	23.2
Good	370	40.5	443	48.6
Fair	259	28.3	152	16.7
Poor	132	14.4	62	6.8
Don't know	93	10.2	43	4.7
	914	100.0	911	100.0
Effectiveness of Faculty in Attending to Curricular Change				
Excellent	107	11.4	232	24.9
Good	426	45.6	472	50.7
Fair	241	25.8	166	17.8
Poor	81	8.7	51	5.5
Don't know	79	8.5	10	1.1
	934	100.0	931	100.0

WHAT ARE THE MAJOR CONCERNS AND ISSUES?

Several issues must be examined if undergraduate education programs in American colleges of agriculture will continue to serve a vital role in developing the human resource base critical to the national and international food and fiber system. The issues often are multi-dimensional in nature, and the issues present a complexity which requires collaborative efforts in their solution. Nevertheless, institutions of higher education must assume responsibility for dealing with the issues and assessing the extent to which changes need to be made. The following six issues are not intended to represent an all inclusive list, but they do represent issues the authors view as needing attention.

Issue One: Undergraduate education in agriculture must continue to expand its scope within a mission orientation rather than following the traditional discipline orientation. This mission orientation should not diminish the role and importance of individual units or departments. However, it requires faculty within departments to approach undergraduate education from a

holistic, more comprehensive perspective. In this study faculty generally supported the mission-oriented undergraduate educational objectives for agriculture. Faculty also emphasized the importance of their role in determining, implementing, and delivering instruction relative to the objectives.

Issue Two: Faculty and students must continue collaborative efforts to assess the extent to which students possess entry-level competence relative to the undergraduate educational objectives. This requires more than the traditional ways we have typically assessed student achievement. Such assessments will require both formative and summative assessments and will require greater time commitments by faculty and students. Obviously, such time commitments by faculty are possible only if appropriate and adequate support is provided within the higher education governance system. Faculty reported they perceived having a key role in assessing and monitoring students' attainment of the objectives. They indicated that role would follow the traditional pattern under the current mode of operation.

Issue Three: Current channels for addressing curricular changes need to be enhanced. Especially at the college level, faculty are most dissatisfied. Perhaps part of this dissatisfaction also may be associated with the nature of the "driving forces" for curricular reform. In many instances, the impetus for reform or modification is viewed as being derived from sources external to the higher education institution. That is, curricular changes too often are perceived as responses to external reports, accountability demands, and demands of the business community (Stark & Lowther, 1988). Higher education must to a greater degree respond to internally generated self-renewal.

In reality, channels for curricular reform should enable a greater degree of internal motivation for changes to surface. The current process for curricular change in higher education often contributes to creating an atmosphere where protection of one's turf surfaces as part of the dialog. We must enhance communications between and among faculty and reduce the rigidity in the process if serious curricular changes are to be made.

Issue Four: Faculty development efforts need to be expanded and improved to meet the needs of faculty. Such efforts must incorporate the resources of internal and external higher education groups. The professional development of faculty members to function effectively within a mission-oriented undergraduate program often contradicts the socialization many faculty experienced in their graduate preparation.

Issue Five: The leadership for establishing an undergraduate mission and objectives is a shared responsibility of faculty and administrators. Faculty play a key role in encouraging administrators to develop consensus among the faculty relative to the mission and objectives at both the college and academic unit levels. Faculty hold the key to the identification of the mission and objectives and the delivery of instruction to support attainment of the objectives. Administrative support is vital to establishing an atmosphere conducive to a dialog where faculty are able to collaborate in establishing the mission and objectives. Administration also has a responsibility to assist faculty in securing resources needed to provide instruction to help students attain entry-level competence relative to the mission and objectives.

Issue Six: Although this study focused only on the undergraduate program, it should not diminish the importance of graduate education in agriculture. Graduate education is critical to developing an adequate number of agricultural scientists for the public and private sector. Specifically, the graduate programs for our future faculty members in agriculture must be reexamined. Current graduate agriculture programs are often technical, discipline-specific, with little effort made to prepare individuals for the total responsibility of a faculty member in higher education. The graduate program for those desiring to enter higher education should prepare them more completely for future research, teaching and public service responsibilities.

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